

June 4, 2007

Payam Bozorgchami  
California Energy Commission  
1516 9th Street, MS-42  
Sacramento, CA 95814-5504

Dear Payam:

This letter will add some additional data to other information sent on February 22 of this year on the cost profiles of roofing systems in California, whether they are of a standard or Cool Roof design. However, instead of being a general coverage of the subject as in the first document, this letter is focusing on the California Energy Commission's call for information on cost comparisons against the low cost non-cool BUR systems that are in the market, specifically the base, three plies and a cap BUR system at \$2.07 per square foot that was identified in Philip Dregger's letter of May 19, 2006. CEC noted that at the costs identified for the various systems (BUR, Modified Bitumen, EPDM, TPO, PVC, etc.), Cool Single Ply Roof systems would not be cost competitive against this one specific BUR system except in climate zone 15. This letter will show that Cool Roof single plies can compete effectively against this system.

The information supplied in Philip's letter was well organized but there were several items that were not clearly defined leaving some question on how the results were obtained. Just one example, were the contractors used in the study equally experienced in both BUR and Single Ply so the cost data was based on equivalent competencies? The contractors used in Southern California for the data contained in this letter were from major BUR contractors that have made major moves into single ply.

The first table below looks at wood deck applications. In this construction, BUR can go directly to the deck and achieve a Class B fire rating as identified in Philip's letter. The single ply systems require substrate materials to help the single ply system obtain the Class B fire rating, therefore, these components are included in the cost of the system. The BUR system in the first column is the system identified in Philip's letter as a key low-cost system. The next two columns are Cool Roof TPO systems, which are shown to be very competitive against the BUR system and emulate the earlier data.

## WOOD DECK

SYSTEM	BUR	Cool Roof	Cool Roof
Deck Ply	BASE	.25 Dens	2-FR Plies
Construction	3-Plies	45-m TPO	45-m TPO
Top Surface	Cap	NR	NR
Cost/sqft	\$2.07	\$2.39	\$2.16

NR – Not Required

The second table looks at the cost of BUR and Single Ply on steel roofing decks. In Philip's letter, the BUR constructions were stated as being cost without insulation as were the single plies. However, BUR and single ply cannot go directly to a steel deck because of the fluted deck design, so some type of substrate is required. With steel deck construction, the insulation is use above the deck so it provides both the R-value to meet the energy design requirements and the substrate for the roof system. However, with the insulations used in this application, Polyiso or polystyrenes, cover boards are required to prevent blistering of the BUR systems. Single plies do not require the use of cover boards and generally go over Polyiso insulation. This is kind of the opposite of the wood deck situation where single plies must use some type of substrate for fire ratings and BUR does not. The cost in the chart below has the cost of the insulation system, which in specific cases includes the cover board where it applies. The costing below does not relate to the data in Philip's letter, first column, because of the inclusion of the insulation, but now shows the true cost of the systems. Again, the Cool Roof single ply systems are shown to be competitive with BUR.

## STEEL DECK

SYSTEM	BUR	Cool Roof	Cool Roof	BUR
Insulation		R-19 ISO	R-19 ISO	R-19 ISO
Cover Board		NA	NA	Cover BD
Deck Ply	NA	NA	NA	NA
Construciton	3-Plies	45-m TPO	60-m TPO	3-PLY
Top Surface	Cap	NA	NA	CAP
Cost/sqft	\$2.15	\$3.67	\$4.18	\$4.93

In addition, CEC requested information on the reflectivity data on the Cool Roof single plies. With the Carlisle TPO Cool Roof system, the table below shows the new as well as 3-year aged data (just obtained) for the membrane as tested to CRRC-1. As can be seen, the three year aged value has a reflectivity rating equal to the minimum value for new material, a rating of .70. In the 2008 Title 24

standard, the aged value will be used directly into the energy calculations, therefore, increasing the energy efficiency of the TPO systems. This compares to the present time where the new membrane value is artificially aged when entered into the energy calculations. As an example, the new TPO membrane reflectivity reading of .79 is being reduced to .59 when plugged into the energy model due to the .2 artificial aging factor. Using the aged value of .70 in turn will increase the energy efficiency of the single ply system offering improved cost savings in most climate zones compared to the non-cool roof BUR.

STATUS	REFLECTIVITY
NEW	.79
3-YR AGED	.70

CEC also asked about the service life of the Cool Roof systems. The issue of service life of a roof system is a long debated subject with varying opinions and conclusions on which system(s) perform the longest. To keep it simple, the best reference is to look at the no-dollar limit warranties that are offered on Cool Roof roofing systems by the major suppliers. They have the confidence in these systems to stand behind them for extended periods of time, something not taken lightly for the cost implications if these systems do not perform. At the present time, there are up to 20-year full system warranties on the 45-mil TPO systems and 25-year warranties on the 60-mil TPO systems.

The above information along with the previous information should help explain the competitive position of Cool Roofing systems in the Californian market. However, this is just some of the data that is being put together during the short notice period given by CEC. This information is being forwarded to show good faith efforts to supply the requested data in a timely manner and to note more is being accumulated. This additional information will be supplied by the end of the week. We appreciate CEC allowing us the opportunity to contribute to the data collection on roof system costs in California.

If you have any questions, give me a call.

Best regards,



Richard J. Gillenwater